

Why We Shouldn't Fracture the Process:  
Oil and Gas Regulations  
in Place to Protect Our Water









**Horizontal Wells  
could have multiple fracs**

**Vertical Wells  
usually have one frac**

**Groundwater**

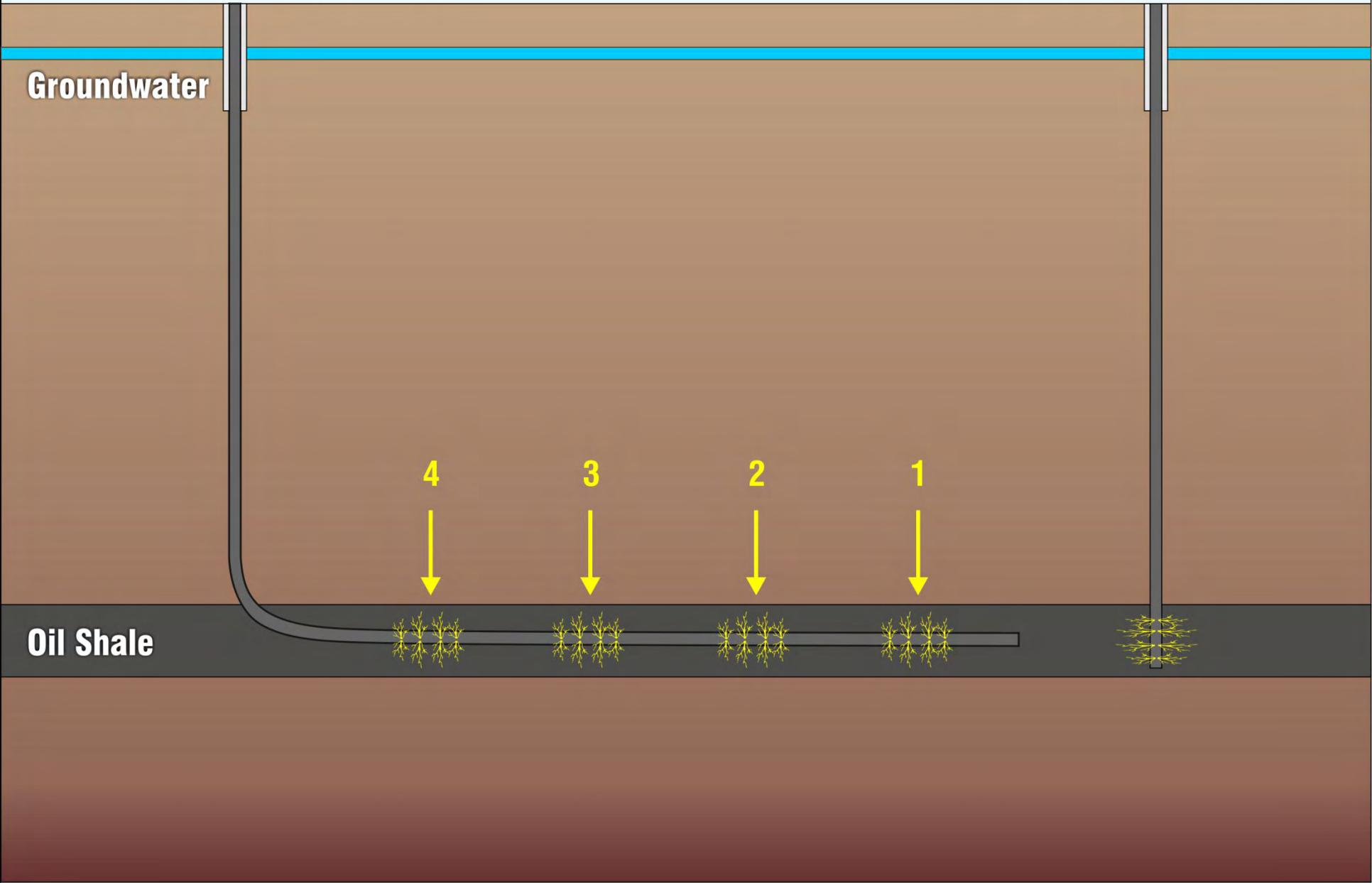
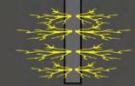
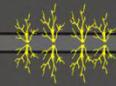
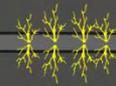
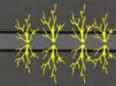
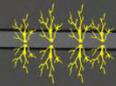
**Oil Shale**

4

3

2

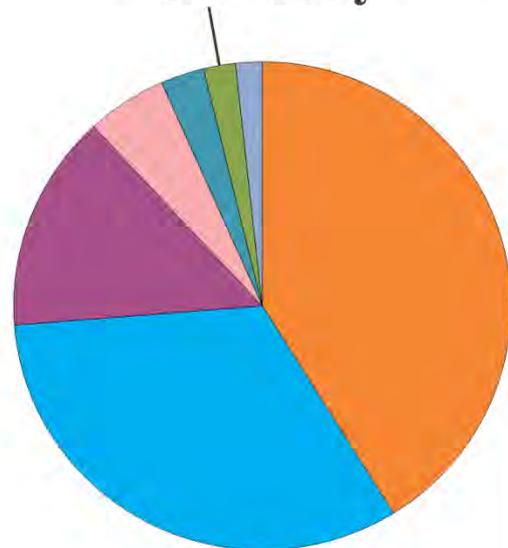
1





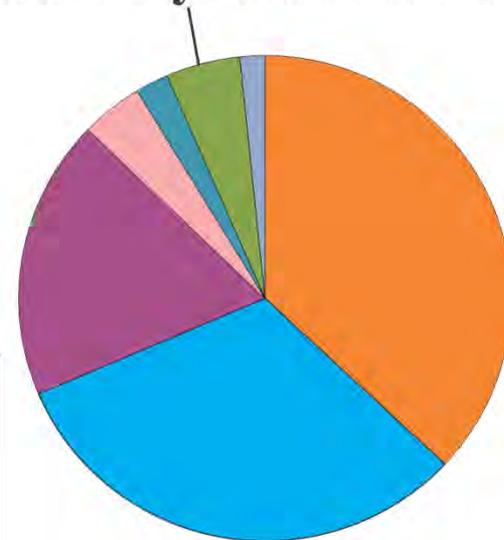
**The Oil & Gas Industry is currently one of the  
smallest users of Oklahoma Water  
- and is projected to remain that way 50 years from now**

**Oil & Gas Industry's  
use today**



**2010**

**Oil & Gas Industry's  
projected use 50 years from now**



**2060**

-  Crop Irrigation
-  Public Water Supply
-  Thermoelectric Power
-  Livestock
-  Self-Supplied Industry
-  Oil & Gas
-  Self-Supplied Residential

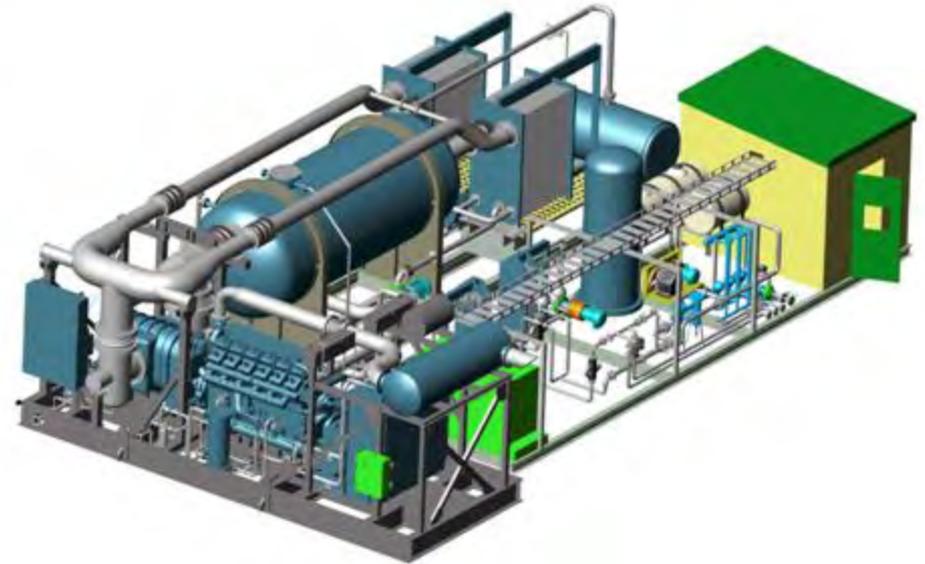
The background features a series of overlapping rectangular blocks in shades of green and blue. A light green block is at the top, followed by a darker green block, and a teal block at the bottom. The text 'Water Recycling' is centered within the light green block.

# Water Recycling

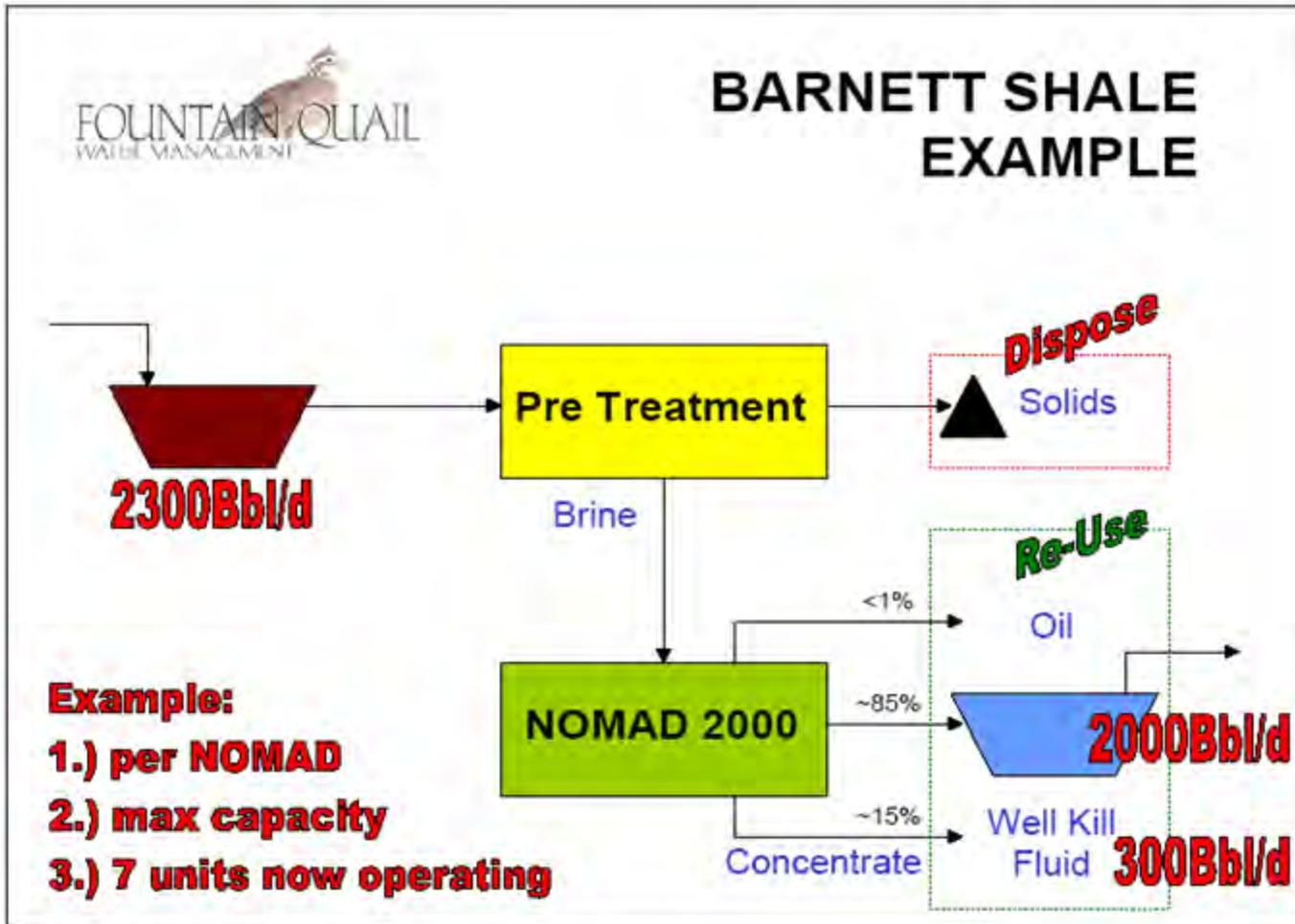
# Mobile Heated Distillation System

## Devon and Fountain Quail Water Management

- Approved by the Railroad Commission of Texas in 2005
- Implemented in 2005
- Vaporizes frack flow-back water and condenses it into clean, distilled water
- Remaining concentrated water removed for disposal or utilized for controlling pressures in another well completion as a “kill fluid”



# Recycle Flow Diagram



# Water Recycling Results

- 22,500 bbls/day at peak
- 12.9 million barrels processed (542 million gallons)
- 10.1 million barrels of distilled water generated (424 million gallons)
- 100+ wells fracked with recycled water



# Challenges with Water Disposal

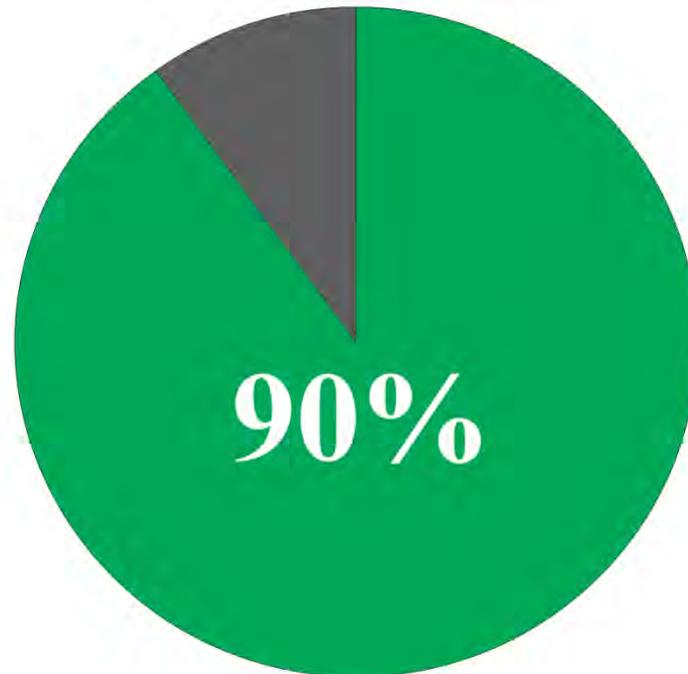
- Finding and maintaining adequate disposal capacity
- Transportation
- Regulatory agencies
- Public education and perception
- Developing cost effective recycling opportunities

# Conclusions

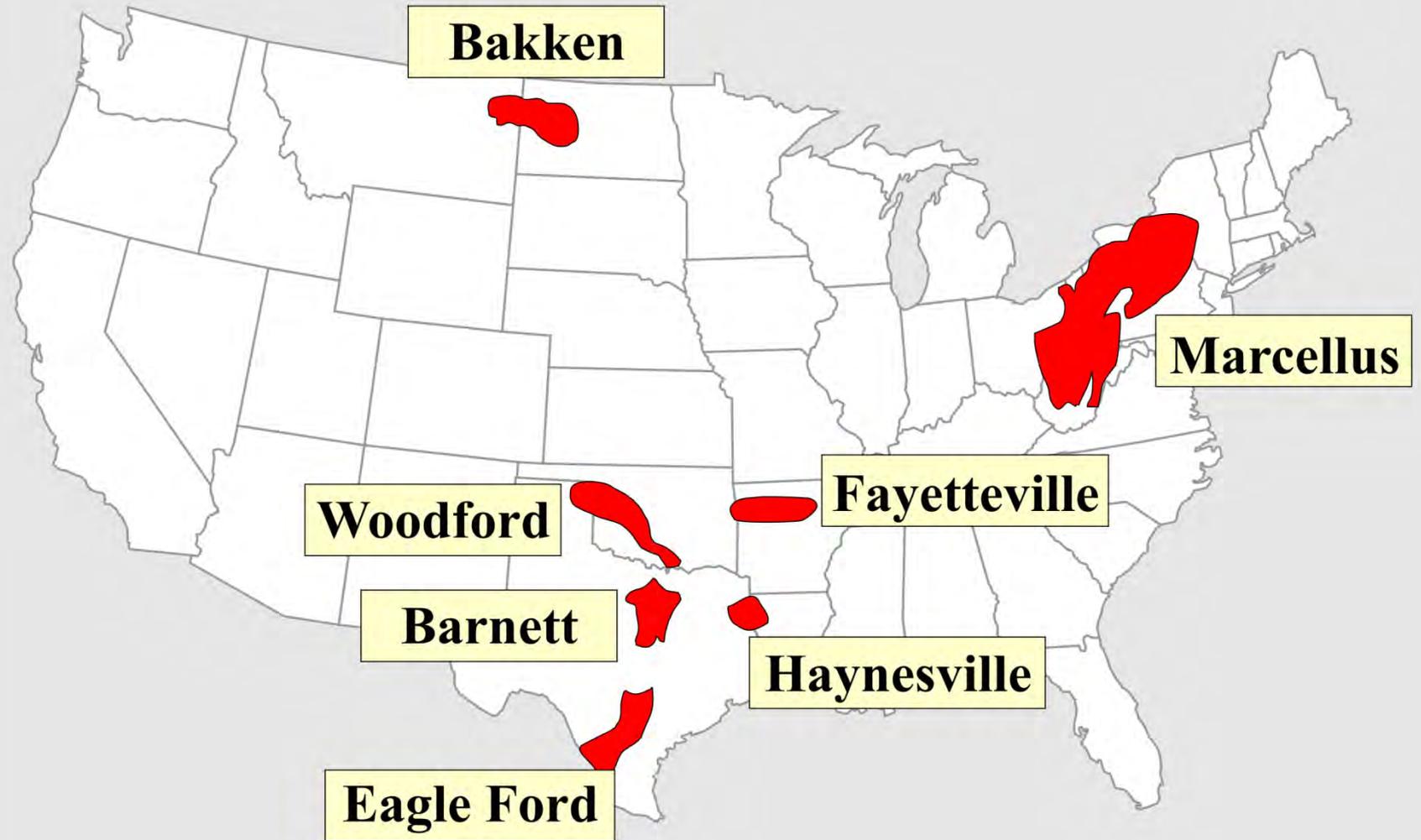
- Water management is a major component of shale gas development
- Conservation, recycling and reuse of water continue to be top of mind in the Barnett Shale region and others as well.
- The ability to recycle “flow-back” has increased dramatically in a very short time through a proactive approach by companies like Devon and Fountain Quail.

# Fracturing Today

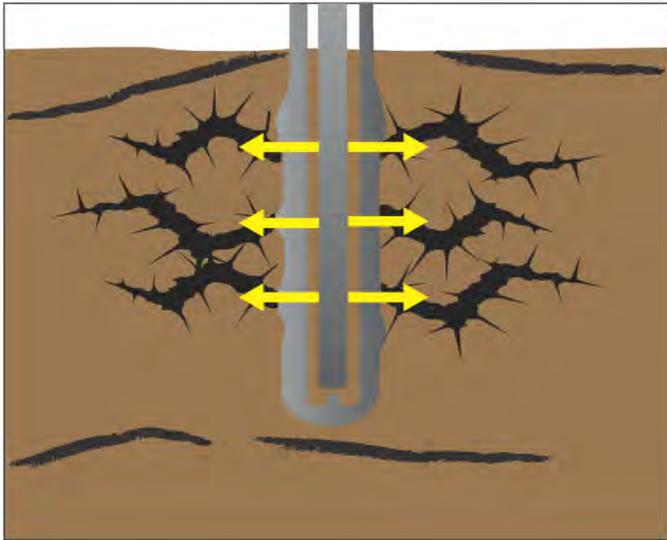
An estimated 90% of the wells in operation today have been fractured and have extracted more than **600 trillion cubic feet of natural gas** and **7 billion barrels of oil.**



# Major US Shale Plays



# 1949



Hydraulic fracturing can be traced back to 1903, but the first commercial fracturing treatment was in 1949.

# 1974



The Safe Drinking Water Act (SDWA) was enacted with the aim to protect public water supplies and establish new standards and regulations for underground sources of drinking water.

Hydraulic fracturing was not considered for regulation under SDWA, even though it had been in use for 25 years.

# 1980



The SDWA was amended to create the authority for states to be granted primacy for regulating Class II injection wells.

Hydraulic fracturing was not considered for regulation under SDWA, even though it had been in use for 31 years.

# 1986



The SDWA was amended to regulate over 100 special drinking water contaminants.

Hydraulic fracturing was not considered for regulation under SDWA, even though it had been in use for 37 years.

# 1996



The SDWA was amended once again, this time to emphasize sound science and risk-based standard.

Hydraulic fracturing was not considered for regulation under SDWA, even though it had been in use for 48 years.

# 1997



vs.



(LEAF) vs. EPA - argued that fracturing of coal bed methane in Alabama should be regulated under SDWA.

# 2002



The EPA releases a draft of their study concluding **hydraulic fracturing did not pose a risk to drinking water.**

# 2002



LEAF challenges EPA's decision to allow Alabama to regulate hydraulic fracturing under its Class II well program.

EPA initiates its own study of hydraulic fracturing

# 2004



The EPA releases its final report on the use of hydraulic fracturing in coal bed methane operations and reasserts that hydraulic fracturing poses “**no threat**” to drinking water.

# 2005



2005 House passes  
bipartisan energy bill which  
clarifies that Congress never intended  
hydraulic fracturing to be  
regulated under SDWA.

# 2007



An explosion occurs in a home in Bainbridge Ohio. The incident was initially blamed on hydraulic fracturing, but it was later determined hydraulic fracturing was not the cause.

# 2008



Outside interest groups expand efforts to attack hydraulic fracturing in mid-Atlantic States - specifically in Marcellus Shale area

HR 7271 sought to strip clarifying language from the 2005 energy bill.

Interest groups push for restrictions on hydraulic fracturing in New Mexico and Colorado

# 2009



Pennsylvania introduces  
resolution supporting  
**continued state regulation**  
of hydraulic fracturing.

# 2009



Texas urges Congress to  
**“maintain state regulatory coverage”**  
of hydraulic fracturing.

# 2009



Alabama asks Congress to  
**preserve state primacy** to  
regulate hydraulic fracturing.

# 2009



Louisiana passes a resolution asking Congress to maintain the exemption of fracing under the SWDA.

# 2009



Oklahoma passes concurrent resolution urging Congress not to pass legislation over hydraulic fracturing.



# Risks of Fluid Intrusion are Low

## **Distance**

There is often significant vertical separation between the fractured zone and ground water zones;

---

## **Construction Methods**

Construction requirements in most states include provisions for cementation above producing zones and across ground water zones;

---

## **Rock Layers**

- Frequently, are capable of accepting fluid under pressure, lowering the available fluid that could reach a ground water zone; and
  - Restrict vertical flow, serving as a hydraulic barrier to fluid migration;
- 

## **Technology**

Computer modeling predicts the 3D geometry of fracturing; lowering the likelihood of a fracture job extending into an unintended zone.

**“I have wondered at times  
about what the  
Ten Commandment's  
would have looked like  
if Moses had run them through  
the U.S. Congress.”**

*- Ronald Reagan*



Once upon a time  
the government had a vast scrap yard  
in the middle of a desert. Congress said,  
**"Someone may steal from it at night."**

So they created a  
night watchman position  
and hired a person for the job.

Then Congress said,  
**"How does the watchman do his job  
without instruction?"**

So they created a planning department  
and hired two people,  
one person to write the instructions,  
and one person to do time studies.

Then Congress said,  
**"How are these people  
going to get paid?"**

So they created two positions:  
a time keeper  
and a payroll officer,  
then hired two people.

Then Congress said,  
**"Who will be accountable  
for all of these people?"**

So they created an administrative section  
and hired three people,  
an Administrative Officer,  
Assistant Administrative Officer,  
and a Legal Secretary.

Then Congress said,  
**"We have had this command  
in operation for one year  
and we are \$918,000 over budget,  
we must cutback."**

**So they laid off  
the night watchman.**

